

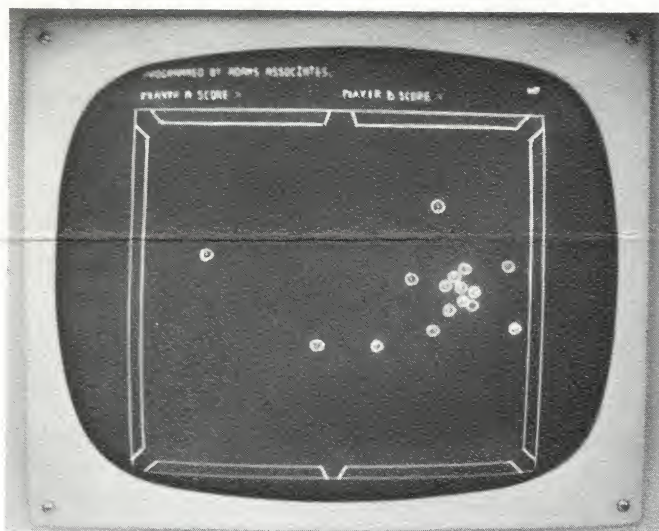


BROGAN REPORT

LATEST DEVELOPMENTS IN DIGITAL TECHNIQUES
FOR DATA SYSTEMS AND INSTRUMENTATION

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SHOOTING POOL BY COMPUTER

Will computers replace man? — a moot point — but they *may* soon replace pool halls. An intriguing development by Information Displays, Inc., Mount Vernon, N. Y., is "Computer Pool" which attracted much interest at FJCC '66. All the competitive pleasure of the original game is retained, the player's skill being the critical factor.

IDI's display, which interfaces with a DDP-116 computer, is a computer-controlled CRT which accepts commands from the computer and from man-input devices. Because it deals directly with graphic and alphanumeric data, the display acts as an interpreter between man and computer and eliminates the need for much software. The pool game — basically a classical three-body kinematics problem — requires that such parameters as coefficients of elasticity, rolling friction and resolution of forces be programmed into the memory system.

Target balls are numbered and racked up conventionally, with the cue ball positioned for the start of the game. The player uses a light pen as a cue-stick to strike the cue ball. He is in control of the strike angle and the forward velocity of the cue ball as he normally would be. When struck, the cue ball moves accordingly, breaking the racked balls. Balls bounce off cushions at realistic angles and carom off each other, slowing down due to the normal attrition of friction. After the break, the game proceeds as desired: straight pool, rotation, or any of the other

varieties. As balls are pocketed, their number values are calculated and shown in real time.

There can be no doubt about a "scratch" (cue ball falling into a pocket). In such a case, the cue ball pops out, moves to the top of the screen, and flashes off and on dramatically.

* * * *



A parallel development is "Computer Golf", which two companies are now offering to the public in indoor installations in several cities. The computer is programmed for every club from driver to wedge, except for the putter. (Putting is done on an artificial green.) Shots must be stroked with the same swing and power as outdoors. Penalties for hooks and slices are the same — it's just as easy to land in the rough! The computer measures the time it takes the ball to hit a screen; a slide picture is projected from a photograph of the tee to one of the area where the ball has landed. Players have their choice of several tournament-caliber courses.

COMPUTERIZING THE INSCRUTABLE STOCK MARKET

The key to any reasoned investment in stocks is history, particularly trends, and projections based upon these. But the form in which such information is offered makes a significant difference in its pertinence to the user. Computers have undergone three generations of refinement, but until recently the mass of printed data they produce could overwhelm the ability of the investor to interpret it when tabulated. The development of computer graphics is the answer. It makes it possible to communicate meaningfully with the new machines. California Computer Products, Inc. (CalComp), Anaheim, Calif., manufactures a broad line of digital plotting systems for conversion of computer output data to graphic form. A much more lucid way of obtaining certain classes of information, including that of the stock market, is provided. Instead of printing out tabulations, data processing systems can now plot graphs or draw pictures containing not only all relevant data, but also the annotations necessary for clarity. Presentation is faster, more accurate, and in a simple format which conveys essential facts that any investor can understand at a glance.

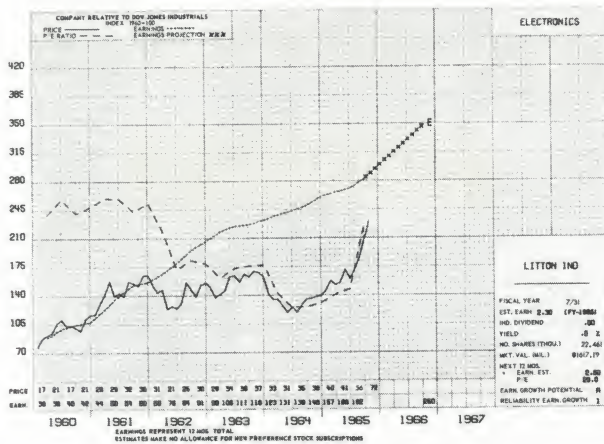


Chart prepared by INFOTEC

The chart above is typical of this kind of digital plotter application. It shows stock price, earnings, and price-to-earnings ratio for Litton Industries relative to the Dow Jones Industrial averages over a period of several years. Annotation lists actual stock price and earnings per share for each calendar quarter, plus other information of interest. The graph is one of 387 included in a quarterly report published by Drexel Harriman Ripley, Inc. for their clients in the investment community. The CalComp system used was a Model 760 off-line tape unit and Model 565 drum-type digital plotter. Plot tapes are prepared on a Control Data 3100 computer.

PROGRAMMING IS PRIMARY — FOR FINANCE OR FUN

Investment is important business — and in this country, so is participation sport. As the growing sophistication of computers has tended to outdistance application capability, programming and the utilization of specially-designed peripheral equipment have been the “open sesame” enabling users to catch up and communicate — whether it be for the stock market or a game of pool.

Infotec, Inc., New York City, is an organization specializing in producing digital-plotting programs and their corollary software support as the solution to an end-user's application problem, designed to meet his particular set of data needs. Their services provide a flexible tool for expeditious presentation of data in graphic form, resulting in substantial savings of work, time and expense. As an example, their staff prepared the stock market charts, discussed in the article above, working with an installation at Standard & Poor's computer service center.

Equally significant for today's needs are Infotec's programming “packages”, which offer an economical, ready-made service to business. Programs have been developed for financial, inventory, sales, statistical and general operations, and are compatible with most computers currently in use.

* * * *

The importance of programming as a valuable technique in the social sciences is becoming recognized

by the Congress. Recently, a subcommittee of the Senate conducted hearings on proposed “systems analysis” bills for governmental grants to both public and private organizations. The money would be used for developing an approach to masses of data concerning serious and growing national problems such as water and air pollution, pesticide control, waste disposal, urban redevelopment, crime, and transportation.

WEATHER-FORECAST DATA STATION WITH MAGNETIC “HEART” GOES TO SEA

If the weather bureau's day-to-day forecasting is sometimes aggravatingly wrong, how much less certain have been attempts at longer-range predictions! It would be comforting to be able to decide on taking your vacation, say a month from now, because you *know* that the weather will be good. That possibility has become a



probability for the near future due to a prototype ocean data station developed and built for the U.S. Navy's Office of Naval Research by General Dynamics.

Oceans play an equal and inter-reacting role with sun and air in manufacturing weather over the earth; oceanographic environmental information (currents, surface and depth conditions, atmosphere) is central to any accurate forecasting. The new station has been successfully operated, through calm and storm, for more than two years. Actually a huge buoy, it contains a complex array of electronic equipment to collect and transmit data. Over a hundred different sensors measure critical factors, ranging from wind velocity and radiation, through surface temperature and wave size, to salinity and underwater pressure. The information is gathered once an hour (timing can be stepped up) and stored by a data acquisition system installed in the hermetically-sealed hull.

At the “heart” of this system is a digital incremental magnetic tape recorder made by Kennedy Company, Pasadena, Calif., that can store up to a year's information. At six-hour intervals the buoy is commanded by a ground station to transmit by radio channel the accumulated data of the preceding twenty-four hours. The time overlap provides a continuous record. Obviously, power conservation is essential to long-time, high-reliability performance of the recorder. The development by Kennedy of special low-current-drain electronics makes the recorder ideal for its function. Utilizing all-silicon transistors, the circuits require power only while the tape is actually in motion.

It is predicted that, within the next ten years, ocean data stations will be strategically located through-

out the earth's seas to comprise an internationally shared system.

OVER-THE-COFFEE TEASERS

Two "tittilaters" to keep the output going while resting. Answers will appear in our next issue.

Try this "numbers" puzzle on for size: Compute the number 37. You may employ only five 3's (no other digits). You must use two additions and one division.

This one is for those expert "numerologists" — the eighth graders: translate the octal-system number

143,746,667,104,770,135,527,701,177
into the binary system.

(Did you ever get the uncomfortable feeling that perhaps your gray hair isn't premature?)

COMPUTERS ENTER THE FUTURE OF CRIME AND DESIGN

The future of law enforcement and of package and advertising design may be greatly altered and enhanced with the aid of computers, thanks to some recent developments and experiments.

A new, closed-circuit television system has been devised for surveillance of given areas and detection of intruders entering them. A camera takes a reference photograph of the normal scene, the data being stored in magnetic memory for comparison with succeeding pictures taken at intervals of 1/30th second. When the scene is altered in any way, such as by the entry of an unauthorized person, an alarm is sounded. At the same time, the figure of the intruder is photographed and picked out in a white outline. This is immediately flashed as an image on the television screen where the security officer is watching.

A further deterrent to potential lawbreakers is a new, portable data processing unit, compact enough for installation in police squad cars.

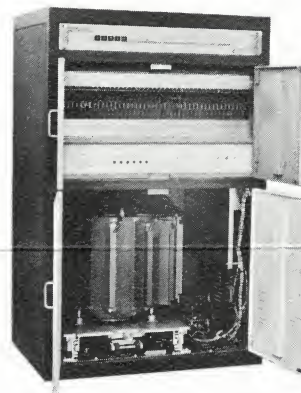
In advertising and design, computer-bred holograms may soon permit designers to present images of their ideas to their clients simply from speculative fancy. It was recently announced that researchers have succeeded in marrying computer technology to the relatively new science of holography. Holography does not produce a photographic print — it creates an image which seems to be suspended in air, utilizing a reference beam of laser light.

The designer's idea, which is to be holographed, is converted into numeric terms and fed to the computer. The computer is programmed to calculate the patterns that would be recorded if light waves, scattered from the object, interfered with waves from a laser reference beam. A plotter draws the object on a sheet, which is then photographed in conventional

fashion. This photograph, in turn, is projected with a holograph lens system to produce the dimensional-appearing floating image — and bring to life the designer's idea.

NEWS OF NEW PRODUCTS

STATE OF THE ART IN DRUM SYSTEMS



Drum memory systems, made by Magne-Head, Hawthorne, Calif., include the interface logic necessary for data exchange between the memory and data sources. Circuit elements accept any digitally coded data and return it on command to its source. This interface versatility minimizes the number of lines for communication with the memory. Systems test to low transient error rates of less than 1 bit in 10^{12} bits; data rates of 2 megacycles at 1300 bits per inch and 100 megabits for larger capacity storage. They are tailored to meet specific requirements, whether they include a small capacity disc or the largest drum modules.

"MISER" MEMORY SYSTEMS

Established in 1965 as a research and development program, to capitalize on its semiconductor capability, Fairchild Memory Products organized advanced techniques in core stacks and memory systems. The MISER System satisfied the speed requirements, 1.6 $\mu\text{sec.}$, full cycle with access times of 650 nano-seconds. Maximum word capacity is 4096 words x 24 bit words. The entire memory system is designed to fit a 19" rackmount, 5.25" high and 20" deep, with low power requirements.

HIGH-SPEED MEMORY LOGIC MODULE

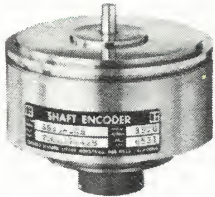
This module, the FT40, made by Scientific Data Systems, provides economical, fast-access storage of 128 bits (sixteen 8-bit bytes) on one module combined with address and driving functions. Read time is 110 nanoseconds or less. Write time is 125 nanoseconds or less. The module contains 16 identical LSI circuits, each consisting of 178 components on a single chip. Each chip contains 8 flip-flops, input and output buffers, 3-bit address decoding and control and power gating. The latter feature removes 60% of power from non-addressed circuits without effecting data. Additional address logic and input buffering external to the IC's is provided on the module.

VERIFY-DUPLICATE SYSTEM

A new one-pass system, at lower cost, for producing verified duplicate punched tapes has been introduced by Roytron, Division of Litton, Clifton, N. J., makers of the widest range of paper tape punch and reader models in the industry. Three readers and one punch duplicate in one continuous cycle. The master tape is read by two readers; the third reader scans the duplicate after

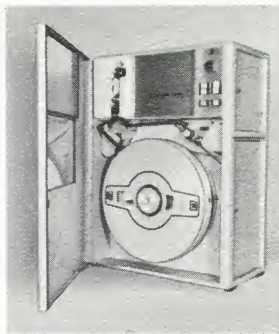
punching. If the tapes do not match in any detail, an error light comes on. The system stops and displays the two non-matching code patterns.

WOULD YOU GIVE GALLIUM ARSENIDE TO YOUR WIFE?



"Only if you were married to an optical encoder. Then she'd light right up." This quote is from a Litton Industries ad for its all-solid state optical encoders, which utilize gallium arsenide light sources for reliability. Under operational conditions, MTBF for a typical 2¹³ full word Litton encoder is 30,000 hours, compared with 5,000 hours, under equivalent conditions, for an encoder using tungsten bulbs.

PORTABLE INSTRUMENTATION RECORDER



An entirely new concept in instrumentation recording in a portable magnetic tape recorder reproducer is the Sangamo 3500 series. This is the only instrumentation recorder of its type capable of operating with 16 inch reels to accommodate 12,500 feet of 1 mil tape, giving up to 42 hours of record time at 15/16 ips. The same system can accommodate 600KHz direct at 120 ips.

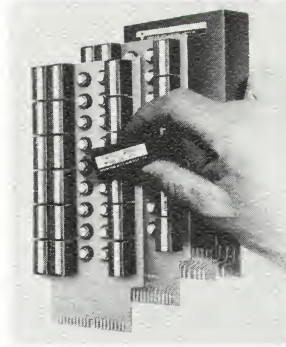
"SPACE CALL"



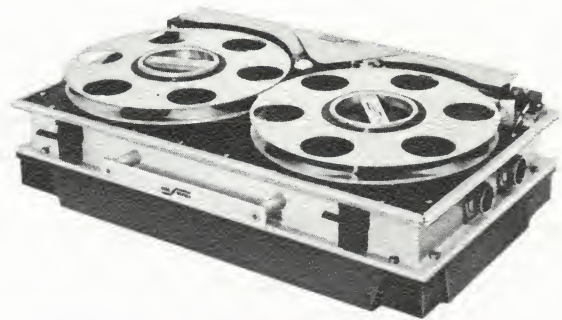
In this electronic age, Brogan Associates maintains real time contact with clients all over the country. Fred Korb, chief pilot, is shown about to take off on a call in a twin-engine Piper Aztec C, from MacArthur Airport near their headquarters office.

**AS A SOLUTION TO THE CONSTANTLY-GROWING
NEED IN THE FIELD, BROGAN ASSOCIATES
IS NOW BUILDING SMALL SYSTEMS
FROM OUR PRINCIPALS' PRODUCTS**

RESOLVER/SYNCHRO TO DIGITS



Resolver/synchro digital conversion, with tracking velocities up to 2000° per second, is the feature of North Atlantic Industries Model 545. This technique provides continuous conversion with minimum staleness and accuracies to .01°. The unit has two basic modes of operation: read-on command (rapid acquisition) and tracking (least significant bit update).

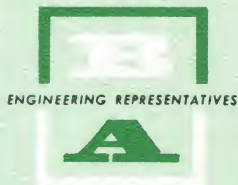


AIRBORNE MIL RECORDER — IBM COMPATIBLE

The Environmental Instrumentation Recorder Series to provide IBM compatible tape recording, developed by Borg-Warner, function in any environment, including space. These tape transports, 7 or 9 track, 556 or 800 bits per inch, record with only 8 moving parts to produce tape motion. Individual DC motors directly drive the reels and capstan, and are explosion-proof. Selectable tape speeds are controlled by a closed-loop servo system and binary countdown chain. The applicable MIL spec for the R-206 Recorder/Reproducer is MIL-E-5400.

COMPUTER INTERFACED PONY PRINTER

An integrated, high-speed printing system is now possible for the small to medium size computer user. The Pony Printer, by Di/An Controls, Inc., Boston, Mass., bridges the gap between higher-priced, high-speed page printers and slow automatic typewriters. Initial investment is lower, and operating and maintenance costs are lessened through compatibility with small, general-purpose computers and plug-in installation; a self-saturated, long-life ink roll instead of a ribbon; and simplicity of adjustment, which can be done by an unskilled operator.



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Representing leading producers of equipment for Data Systems and Instrumentation: Borg-Warner; CalComp; Di/An Controls; Fairchild Memory Products; Information Displays; Infotec; Kennedy Company; Litton Industries Encoder Div.; Magne-Head Div. of G.I.; North Atlantic Industries; Roytron; Sangamo; Scientific Data Systems

At your request, we will be glad to furnish further information concerning any products mentioned in this newsletter.